MICROBIAL BIOSURFACTANTS: FROM LAB TO MARKET: HURDLES AND HOW TO TAKE THEM.

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Biosurfactants have been the subject of an impressive amount of research efforts, both by academia as by the industry. Two major factors that have been limiting real commercialization of biosurfactants in the past are firstly the limited structural variety and secondly the high production price due to low inherent productivities, small scale and/or a lack of process knowledge.

A solution can be offered by an integrated process design (IPD) approach, where the entire innovation chain is taken into account. Genetic engineering on one side of the spectrum generates new strains, which are subsequently subjected to thorough investigation of the production processes, with feedback coupling to the strain level. Subsequent scale up on one hand enables assessing the scalability of the processes and performing techno-economical and LCA analyses, but on the other hand also results in the generation of kg scale biosurfactant samples of high purity. The availability of such large amounts of a portfolio of molecules enables thorough application research of the new molecules and their derivatives in a vast variety of sectors.
This approach has been applied for one of the showcases of biosurfactant production: the yeast *Starmerella bombicola*. The development of a molecular toolbox enabled the generation of several new *S. bombicola* strains, efficiently producing new-to-nature biosurfactants. These new strains were subjected to an iterative optimization process, while the production processes (fermentation and purification) for each new biomolecule/strain were investigated in parallel. Dedicated application research identified possible valorization options and a business case for the commercialization was recently finalized. The combination of these efforts is expected to result in real market penetration of these molecules in the near future.